

Solve each system of equations using the substitution method. Show work. Remember our answers should be an ordered pair!!

1.  $\begin{cases} 2x + 4y = -2 \\ y = -2x - 5 \end{cases} \quad (-3, 1)$

$$\begin{aligned} 2x + 4(-2x - 5) &= -2 \\ 2x - 8x - 20 &= -2 \\ -6x - 20 &= -2 \\ -6x &= 18 \\ x &= -3 \end{aligned}$$

$$\begin{aligned} y &= -2(-3) - 5 \\ y &= 6 - 5 \\ y &= 1 \end{aligned}$$

2.  $\begin{cases} y = 2x + 3 \\ -2x + 3y = 9 \end{cases} \quad (0, 3)$

$$\begin{aligned} -2x + 3(2x + 3) &= 9 \\ -2x + 6x + 9 &= 9 \\ 4x + 9 &= 9 \\ 4x &= 0 \\ x &= 0 \end{aligned}$$

$$\begin{aligned} y &= 2(0) + 3 \\ y &= 0 + 3 \\ y &= 3 \end{aligned}$$

3.  $\begin{cases} y = -2x - 4 \\ 3x + 4y = -6 \end{cases} \quad (-2, 0)$

$$\begin{aligned} 3x + 4(-2x - 4) &= -6 \\ 3x - 8x - 16 &= -6 \\ -5x - 16 &= -6 \\ -5x &= 10 \\ x &= -2 \end{aligned}$$

$$\begin{aligned} y &= -2(-2) - 4 \\ y &= 4 - 4 \\ y &= 0 \end{aligned}$$

4.  $\begin{cases} y = -2 \\ 4x + 3y = -10 \end{cases} \quad (-1, -2)$

$$\begin{aligned} 4x + 3(-2) &= -10 \\ 4x - 6 &= -10 \\ 4x &= -4 \\ x &= -1 \end{aligned}$$

$$y = -2$$

5.  $\begin{cases} 4x - 2y = 2 \\ x + 2y = 3 \end{cases}$

$$\begin{aligned} 4x - 2y &= 2 \\ x + 2y &= 3 \end{aligned}$$

$$\begin{aligned} 4(-2y + 3) - 2y &= 2 \\ -8y + 12 - 2y &= 2 \\ -10y + 12 &= 2 \end{aligned}$$

$$\begin{aligned} -10y + 12 &= 2 \\ -10y &= -10 \\ y &= 1 \end{aligned}$$

$$\begin{aligned} x + 2y &= 3 \\ x + 2(1) &= 3 \\ x + 2 &= 3 \\ x &= 1 \end{aligned}$$

$(1, 1)$

Create a system of equations that represents each situation. Be sure to define your variables. Then solve the system using the **SUBSTITUTION METHOD**.

5. The sum of a small number and a large number is 50. The larger number is 10 more than three times the smaller number. Find the two numbers. Let  $x$  be the smaller number and let  $y$  be the bigger number.

$x = \text{SMALLER}$   
 $y = \text{LARGER}$

$$x + (3x + 10) = 50$$

$$4x + 10 = 50$$

$$4x = 40$$

$$x = 10$$

$$x + y = 50$$

$$(10) + y = 50$$

$$10 + y = 50$$

$$y = 40$$

Equation 1:  $x + y = 50$

Equation 2:  $y = 3x + 10$

Solution:  $(10, 40)$

Solve each of the following equations for the indicated variable.

6.  $6x - 2y = 36$ ;

Solve for  $x$

$$6x - 2y = 36$$

$$+ 2y \quad + 2y$$

$$\hline 6x = 2y + 36$$

$$\frac{6x}{6} = \frac{2y}{6} + \frac{36}{6}$$

$$x = \frac{1}{3}y + 6$$

7.  $2x + \frac{1}{4}y = -5$ ;

Solve for  $y$

$$2x + \frac{1}{4}y = -5$$

$$-2x \quad -2x$$

$$\hline 4 \cdot \left(\frac{1}{4}y\right) = (-2x - 5)4$$

$$y = -8x - 20$$

8.  $I = prt$ ;

Solve for  $r$

$$I = prt$$

$$\frac{I}{pt} \quad \frac{prt}{pt} \quad r = \frac{I}{pt}$$

9.  $P = 2L + 2W$ ;

Solve for  $W$

$$P = 2L + 2W$$

$$-2L \quad -2L$$

$$\hline \frac{P - 2L}{2} = \frac{2W}{2}$$

$$\frac{P}{2} - L = W$$

$$\frac{P}{2} - L = W$$